ROTUNDA

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Landscape Images

Eyes in Stone

Discover the ROM

The Encantadas

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ROTUNDA

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Cover: Rock paintings on Lac la Croix. (Photo Brian Molyneaux)

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On the Student Participation Programme

Joan Fitzpatrick

I'M SORRY, I HAVEN'T TIME to have my picture taken. I'm too busy making money for the Royal Ontario Museum."

The scene was a *Roman Fun Night* at George Hamilton Public School in the village of Welcome near Port Hope. The speaker, twelve-year-old Sarah Rado, was selling tickets to would-be Romans who were lining up to don togas, recline Roman style, be served by slaves, and then photographed. Sarah's great-grandfather, Dr. Charles Trick Currelly, first director of the Royal Ontario Museum of Archaeology, would have nodded approvingly at her words and her efforts. He knew what it was to raise money for the Museum.

Why did this school choose to allocate to the ROM money that would usually be raised for its own playground? And why did it choose a Roman theme? The answer lies in the kit of curriculum materials,

Opposite page: A papier mâché dinosaur bulging with coins is brought to the Museum by children of Bracebridge Public School. Dr. Chris McGowan, Curator-in-charge of the Department of Vertebrate Palaeontology, wields the scalpel.

Left: A Roman soldier stands guard during the Roman Fun Night *at George Hamilton School, Welcome, Ontario.*

ROM wasn't built in a day, sent out by the Student Participation Programme with an appeal for help in the renovation and expansion of the ROM. Principal Robert Fair and his teaching staff read the kit carefully, responded to its plea, and decided to "go Roman for the ROM".

That evening at George Hamilton the kit came alive! Roman citizens in togas, soldiers in helmets and breastplates, gladiators with swords and shields roamed the halls. Classrooms offered gladiator chess, a dig for Roman coins, ROMopoly, a puppet show. Dressed as Roman matrons, mothers from the Parents' Committee ran a bake sale and a ROMage sale. Members of the community donated items for a silent auction. The net profit for the evening was $800.00, of which $500.00 was contributed to the Renovation/Expansion Fund of the Royal Ontario Museum.

Each year some 220,000 students and teachers visit the ROM, 46 per cent from the Metropolitan Toronto area, 54 per cent from the rest of the province. Students of all ages crowd the halls and galleries, where, under the guidance of experienced Museum teachers, they are introduced to magnificent world-famous collections. The whole panorama stretches before them, from the silent order of the mineral kingdom through the development of life and the growth of civilization. In the words carved at the entrance to the main building, the collections represent "THE RECORD OF NATURE THROUGH COUNTLESS AGES, THE ARTS OF MAN THROUGH ALL THE YEARS".

For the ever-increasing number of visiting classes there will be additional facilities in the renovated building: a group entrance off the newly named Plaza of the Schools, a cafeteria, and various activity centres. For classes without easy access to the ROM, the Extension Services Department is constantly developing new travelling cases of artifacts, adding bilingual text to them, and extending the range of the two museumobiles that visit schools and libraries throughout the province.

Since the education of Ontario students is of major concern to the Royal Ontario Museum, it seemed only natural that the Museum should ask for the support of the students. The task of those who initiated the Student Participation Programme was not a simple one. They had to find a creative and appealing theme, one that would stimulate students to investigate and to learn and at the same time reflect the teaching integrity of the ROM—and thus be acceptable to the boards of education whose permission was required for fund-raising efforts in the schools. Under the chairmanship of Joan Randall, a strong advisory council was formed. It included representatives from the Ministry of Education, the Museum's Education Services Department, the Public and Separate School Boards, and the Ontario Teachers' Federation.

The choice of a Roman theme for the kit of curriculum materials was a natural outcome of the already established campaign slogan: "ROM wasn't built in a day." Teachers from the ROM's Education Services Department, from Metropolitan Toronto schools, and from the Ontario Teachers' Federation—with the cooperation of the curatorial staff of the Greek and Roman Department—put the story of the Romans into a concise and attractive package. Nine study units, superbly illustrated in colour, were produced; they were based on the Roman collections of the ROM and covered the main aspects of Roman life.

For French schools, a French text was included. The cost was underwritten by private donors and a Wintario grant.

In late September of 1979 a mammoth Roman Carnival, organized by the Members' Volunteer Committee, launched the programme. The two-day carnival turned the Museum into a showcase for the schools. At the same time the *ROM wasn't built in a day* kit was distributed to more than 5,000 Ontario schools—public, separate, and independent. Where distances permitted, volunteers followed the kits into the schools; they spoke to principals and teachers on request, showed slides, draped togas, arranged vine leaves, and handed out Roman recipes.

Despite busy schedules planned a year in advance, many schools managed to fit in fund-raising events for the ROM this past spring. Many others have exciting plans for this fall. Some events will have a Roman theme; others will be traditional fund-raisers: READ-A-THONS, WALK-A-THONS, BAKE SALES, and CAR WASHES, occasionally with a Roman twist—the car wash may turn into a chariot wash and the bake sale brownies into *"quadrae cacaoticae"*.

Roman events in the spring of 1980 appear to have been the imaginative learning experiences that everyone hoped for. Richview Collegiate Institute, Etobicoke, debated in a Roman forum; Étienne Brulé École Secondaire, North York, danced in togas; Loretto Abbey, North York, modelled a Pompeian villa for its Latin Festival; the National Ballet School, Toronto, interpreted a Roman sacrifice; Ridley College, St. Catharines, held a Roman Games weekend; the Classics Department of Eastdale Collegiate and Vocational Institute, Oshawa, staged an authentic Roman banquet; and to the delight of their students, the teachers at Dearcroft Montessori School, Oakville, adopted the role of slaves for a day.

The chariot race at Winston Churchill Collegiate Institute, Scarborough, won special acclaim. It was run at the close of a Roman Day which featured togas at assembly, lunch at a Roman Market, and a soothsayer and a snake for a "Roman Experience". The rules of the chariot race required that the chariots be drawn by four students and carry one driver. As Principal W. C. Miller, toga billowing in the breeze, watched his "Romans" pounding around the track and down the home stretch, he commented: "You know, I didn't think my technical students would ever be interested in Roman history—but building these chariots did it!" The word has spread and now many chariot races are scheduled for the fall.

Bryan Vickers, Head of the History Department at Leaside High School, East York, who helped in the development of the kit, took a different tack. He felt that hard hats with the blue ROM logo might become the symbol of young people helping to build the ROM. One hundred hats were sold in a day, and a second order was placed. A raffle preceded the sale of

Right: The Classics Department of David and Mary Thomson Collegiate Institute, Scarborough, supports the ROM with a "chariot" wash. ROM hard hats and gladiator T-shirts designed in the school were for sale.

Opposite page: Charioteers race down the home stretch at Winston Churchill Collegiate Institute, Scarborough, recalling the excitement of a Roman circus.

hats; a car wash followed it. With its cheque to the ROM, Leaside High School presented a scroll, executed in superb calligraphy by members of the Art Department and bearing the signatures of all the students and staff of the History Department. Hard hats caught on. Sometimes they acted as a catalyst, for example, at the READ-A-THON at Crescent Town Public School. There the students, under the direction of their librarian, Ken Gausman, read 1,759 books to raise money for the ROM—spurred on by hard hats as prizes.

Often two or more schools worked together to make an event more lucrative, more fun. In Toronto, Upper Canada College auctioned off Bishop Strachan School's cakes at astronomical prices and art students at Parkview Secondary School made ceramic happy-face pins to be sold at the Bishop Strachan fair.

For many schools throughout the province, ROM Day, 1 May 1980, organized by Publicity Chairman Joan Thompson, provided the stimulus. "Help with your nickels, dimes, and dollars," urged the flyer. From centres in Essex County in the southwest to Stormont, Dundas, and Glengarry in the southeast, from Hearst, Kapuskasing, Kenora, and Dryden, and from points between, including Manitoulin Island, the cheques came in. Students who value the Museum and have used its resources over and over again were expressing their gratitude. "Please make good use of this money," wrote Terry Arnold of Class 4B, Amabel-Hepworth Central School.

All these hard-earned dollars will go towards the 10.3 million dollar private sector goal of the Renovation/Expansion Campaign Fund and will be matched by Wintario (collected to date in the private sector 9 million dollars). All schools participating in the programme until 1 December 1980 will receive a formal certificate of thanks and will have their names recorded for posterity in the new ROM.

In 1918, with the Museum coffers empty, Dr. Currelly was examining photographs of the famous Chinese tomb figurines that are now part of the ROM collections. "I'll tear the money out of Toronto in ten-cent pieces before we let such a chance slip," he vowed. In 1980 it appears that the students of Ontario, too, are determined. They may well take pride in their efforts and should find great satisfaction in knowing that they have contributed to the future of one of the world's great museums—which exists on their very doorstep.

Dr. Currelly would again nod approvingly.

Joan Fitzpatrick is School Liaison Chairman for the Student Participation Programme and a member of the Board of Trustees of the ROM.

Photos: p. 4 Stanley Farrow, David and Mary Thomson C.I.; p. 3 Joan Fitzpatrick; pp. 2, 5 Photography Department, ROM.

Right: The meaning of many of these paintings is unknown. This image may have been inspired by an artist's dream.

Opposite page: These images, painted in red ochre, are located on a large cliff face high above the water on Lake of the Woods.

Landscape Images

Rock Paintings in the Canadian Shield

Brian Molyneaux

IN 1973 A DRY WINTER caused a drop in the level of the lakes of northwestern Ontario. By late summer, the receding waters of Cuttle Lake, along which I was paddling southward, had exposed the gnarled stumps that marked an earlier shoreline.

I had returned to Cuttle Lake to photograph a small group of rock paintings that lay close to the water on a low, blockish cliff near the lake's end. As the formation came into view, however, I could see that its face had changed. What I remembered was an unbroken wall, but now the dark mouth of a cavity in the rock rose above the water. I brought the canoe alongside and leaned under the smooth overhang, but there was not much space between the water and the ceiling of the cavity and I could see nothing in the dim light. I began to paddle again, for the paintings I had come to photograph were several canoe lengths beyond the cavity. Then, as I cast one last glance back, a stray reflection lit up a patch of red on its sloping ceiling. I dived into the water and entered the cavity. Above me there was a large circle painted in red ochre.

Why did the artist choose this hidden place for his work? The many other rock painting sites of the Canadian Shield in northern Ontario, Manitoba, and Saskatchewan are usually found on the exposed faces of shoreline rocks, where they are visible to the passing traveller. The placement of the small group of images I had come to photograph is typical. A slight overhang shelters part of the cliff from the moisture that sustains the algae and lichens covering the rest of the cliff. On this bare surface, marked only by a brownish patina and the thin white streak of a mineral deposit, the painter applied red ochre pigment by hand to form a human figure, a circle with a dot in its centre, and several other designs that have almost weathered away. What these images signified to the

artist and to others in his culture is unknown. If the circle hidden in the cavity had a similar communicative purpose, however, it must have been directed towards other than human eyes—spirits within the rocks, perhaps, or in the deep water below.

To gain some insight into the meaning and purpose of the rock paintings, we should examine the culture of the artists, Algonkian-speaking ancestors of the present Ojibwa inhabitants of the region. Yet early writings and Native lore tell us little of this artistic tradition. Painted rocks were described by explorers, missionaries, and voyageurs who travelled into the interior of the continent, but a European taste often coloured their brief descriptions with a mixture of awe and contempt for the seemingly primitive art.

One account, however, reflects the strong feeling that some of these rock painting sites still inspire when they are encountered unexpectedly in an apparent wilderness. On 26 June 1673, a Jesuit priest, Father Jacques Marquette, and his companion, explorer Louis Joliet, left a village of the Illinois people to search for the mouth of the Mississippi River. They carried with them the gift of a ceremonial stone pipe to protect them from the dangers ahead.

> While Skirting some rocks, which by Their height and Length inspired awe, We saw upon one of them two painted monsters which at first made Us afraid, and upon Which the boldest savages dare not Long rest their eyes. They are as large As a calf; they have Horns on their heads Like those of deer, a horrible look, red eyes, a beard Like a tiger's, a face somewhat like a man's, a body Covered with scales, and so Long A tail that it winds all around the Body, passing above the head and going back between the legs, ending in a Fish's tail.
>
> *Jesuit Relations* 59:139, 141

Unfortunately, these early sources, and the journals of later travellers north of the Great Lakes, provide only the briefest glimpse of Native beliefs and rituals connected with the art. And regarding all the hundreds of rock art sites in the Canadian Shield and elsewhere in the northern part of the continent, Native traditions are strangely silent. When the geologist A. C. Lawson visited and recorded a petroglyph site and a rock painting site on Lake of the Woods in 1884, the Indian people could tell him only that the art must have been made by the "old people" long ago. It seems quite likely, then, that by the time of European contact this widespread practice was already in decline and died out soon afterwards.

With this very limited amount of background knowledge, we must look for the meaning and the function of the rock art in the images themselves. In general, the vigorous paintings, created by hand and not with a brush, reflect the woodland hunting cultures that have existed in the Canadian Shield for thousands of years. This preoccupation is evident in the many game animals depicted on the rocks. There

are, however, other figures, which must have come from the imagination of the artists: creatures with the features of animals and fish, horned serpents, and thunderbirds. At a site on Darky Lake in Quetico Park, there is a group of paintings that combines these themes. On a cliff face split by crevices, several canoes are painted in two ranks. At one end of this group, and slightly above it, a bull moose is depicted. Curving around and partially enclosing these images is a horned serpent, an underwater manitou in Algonkian mythology. One can imagine a hunting party stopping at this place and painting the images to invoke the protection of the manitou. It seems quite likely that most of the rock painting sites were the focus for sacred beliefs and rituals designed to serve the practical needs of the artist and his culture.

To learn more about the art, we need to place the individual sites in time. With the exception of a few images of guns, flags, and other objects of recent origin, however, there is nothing in the paintings to date the sites. Even if there happens to be a buried habitation nearby, the archaeological evidence cannot be applied to the rock art, which is located above ground and cannot be directly associated with other artifacts. It is difficult even to generalize about the maximum length of time that it would take for the pigment to weather away completely. The ochre bonds to the rock surface and is gradually covered by a protective skin of dissolved minerals conducted over the rock in groundwater seepage. The rate of erosion would depend upon the stability of the rock and the specific microclimatic conditions at the site.

Without a method for dating the rock paintings, it seems that interpretations must be drawn from the subject matter alone. There is one additional aspect of the rock art, however, that may provide useful information: the physical characteristics of the site. Unlike other kinds of prehistoric artifacts, the rock art is not only found in the precise location of its creation, but it is in a place that has probably changed very little since the paintings were made. Consequently, we are able to view the sites from the same vantage point as the artist—if only through the eyes of a culture far removed in time.

The location of a site may have directly influenced the way the rock was painted—an insight gained when the site is recorded. When the recorder traces a rock painting, he must work from the same position as the artist did. If the artist stood in a canoe or balanced on a narrow ledge to paint, the work displays a rough simplicity. If, however, he had a dry and substantial base to support him, the work shows greater precision of line and detail.

Above: In this place the artist painted many kinds of images from a simple hand print to a mythical creature with a horned back.

Opposite page: The mouthlike rock cavity is an entrance to the world of the spirits.

When rock art is viewed within the context of the surrounding landscape, it becomes evident that many of the sites are associated with unusual or striking rock features: massive cliffs, large crevices or cavities, prominent overhangs, or strangely glaciated or weathered surfaces. Like the painted circle in the rock cavity on Cuttle Lake, or a snake depicted at the entrance of a large crevice, some natural features have been clearly perceived by the artist and incorporated into the art. At other sites the association may be more subtle. On Lake of the Woods there is a painting site situated on a rock that owing to its dark colour appears to be entirely unsuited for the equally dark paintings that are barely visible on its surface. When the rock is viewed from a different angle, however, it becomes the profile of a large fishlike form, with a natural crease in the rock clearly defining the mouth. At Nett Lake in Minnesota, there is a petroglyph site located on an island with one peculiar feature. When one walks on the polished rock it gives out a drumlike sound.

These special places, distinct in their environment, may be interpreted as part of a larger tradition of beliefs and rituals concerning what might be called the sacred landscape. The Ojibwa regarded all prominent or unusual places as the abodes of spirits or manitous. Offerings were commonly left there to propitiate these spirits—a practice that has persisted to this day at some rock art sites. One kind of spirit that undoubtedly dwelt at rock art sites was the Maymaygwayshi, a small being who lived among the shoreline rocks and used their crevices or shallow caves as entrances into the rock. Other places were seen as the sites of supernatural transformations. In 1636 the Jesuit missionary Father Brébeuf described a rock on the Ottawa River that was thought to be a man who had been turned into stone. The Indian people believed that in the hollow of this rock there was a manitou. They offered tobacco to the spirit—sometimes placing it in a cleft and sometimes shooting it at the rock on the tips of arrows (the Chevalier de Troyes described the latter practice later in the 17th century).

Below: At another site on Lake of the Woods, the small human figure bears the symbols of supernatural power.

Right: When this site is viewed from the north, the rounded outcrop above the paintings resembles a large fishlike creature rising above the water. This unusual natural feature may have prompted the artists to paint here.

If such rocks signify points of contact with the hidden world of the sacred, then it is reasonable to extend the interpretation to the rock painting sites. They share the same special quality of being set apart from the surrounding natural environment. Perhaps the rock paintings should be seen as a more permanent kind of offering than the tobacco—one that expresses a visible bond between the natural and the spiritual world, with the images inspired by the dreams or visions of the painter. The painted circle on the ceiling of the cavity on Cuttle Lake seems to show this explicitly: the circle and the opening in the rock represent entrances to other realms; the cavity itself is a dreaming place or vision site.

We can only guess at the identity of the seeker and painter of the visions. The late Selwyn Dewdney, Research Associate of the Royal Ontario Museum, searched for the answer in his many years of study at almost three hundred sites in the Canadian Shield. He viewed rock art as part of the Algonkian pictographic tradition associated with shamanism—like the song records, the birchbark scrolls of the Midéwewin religion, and the manitou charts of the shaman who conjured in a shaking tent. It was at the vision site, an isolated place where the shaman secluded himself to fast and dream, that Selwyn had hoped to find evidence to connect this visionary quest to the art. If the rock paintings were dream records, then there should be places nearby—rock shelters, cavities, or ledges—where the shaman could dream.

I accompanied Selwyn on one search for a vision site near rock paintings on a lake in the northern Shield. We paddled far down the lake from the rock painting site but could find nothing. Several years later, a companion and I searched an inlet that we had not explored before. Attracted by a large cliff with a massive angular rock at its base, we discovered high on the rock a large shelter which was partially hidden by white pines that had gained a foothold at the entrance. We climbed a series of ledges and found that the roomlike cavity was large enough to stand in and had a commanding view of the eastward expanse of the lake. At the entrance of this room was an unusual pictograph, reminiscent of the design of a birchbark scroll of the Midé shaman. This may well have been the site that Selwyn Dewdney sought—the place that sheltered the visionary and painter of dreams.

Right: The turtle is the manitou that symbolizes the earth.

Brian Molyneaux joined the Department of New World Archaeology as a Field Associate in November 1979. He received his M.A. in art and archaeology from Trent University in 1977 and has conducted seven years' research on the prehistoric rock art of the Canadian Shield.

Photos: pp. 6, 7, 8, 9, 10 (2), 11 (top) Brian Molyneaux; p. 11 (bottom) Rob Ferguson.

Eyes in Stone

Tales of Trilobites

David M. Rudkin

IN ADDITION TO PLAYING an important part in helping us to decipher the mysteries of the Palaeozoic Era, trilobites, the oldest proven arthropods, provide the amateur collector of fossils with an endless source of pleasure. Perhaps no other group of fossils has been as widely sought or as much admired as the trilobites; they have even been used as jewellery, by both ancient and modern man. Their complexity and bewildering variety of form make them seem more alive than most other fossil organisms. One can almost imagine them moving about, with their compound eyes forming intricate images of the ancient worlds around them.

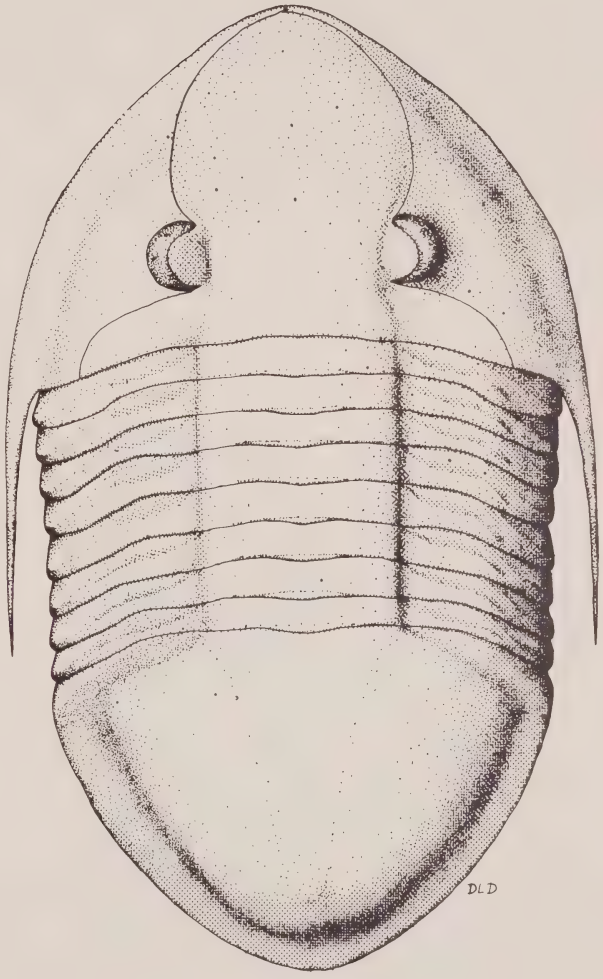
In terms of both numbers and ecological diversity, arthropods are the most successful of all animal groups. These invertebrates with jointed legs have a long geological history; modern forms, including the familiar insects and crustaceans, represent the culmination of many millions of years of evolution.

Trilobites first appear in the fossil record near the base of the Cambrian Period, some 570 million years ago. They diversified rapidly in Cambrian time, experienced an equally rapid reversal in Ordovician time, and subsequently began a long, slow decline through the Silurian, Devonian, and Carboniferous periods. Their rather mysterious extinction, along with a number of other animal groups, came at the close of the Permian Period about 225,000,000 years ago.

Throughout their 350,000,000 years of existence, trilobites, as a group, were characterized by a few important features. They were all marine creatures possessing mineralized exoskeletons (external skeletons) divided longitudinally into three more or less distinct lobes (hence the name TRI-LOB-ITE). The exoskeleton was also divided transversely into three main regions: cephalon (head), thorax (body), and pygidium (tail). The thorax was further divided into a series of articulated segments.

Typical arthropods, trilobites had paired, jointed limbs which functioned as sensory, locomotive, feeding, and respiratory organs. These soft parts, however, are rarely preserved and most of our information about trilobite appendages comes from a small number of specimens from a few localities.

In the process of growing, trilobites periodically moulted their hard exoskeletons to form new slightly larger ones. During moulting the rigid exoskeleton split along predetermined lines of weakness, and the trilobite emerged with a new unmineralized carapace which eventually became impregnated with calcium carbonate. Most trilobite fossil remains found today are the parts of the exoskeletons cast off during moulting; individual specimens that died and were preserved in their entirety are relatively scarce.



Above: Isotelus maximus, *reconstruction of the exoskeleton. About natural size.*

Opposite page: Isotelus maximus, *about 9 cm long. This specimen shows one of the pair of long genal spines characteristic of, but seldom preserved, in this species. Georgian Bay Formation, Toronto.*

The detailed morphology and overall size of trilobites vary greatly from species to species. An average-sized trilobite is about 4 cm to 6 cm long, but the smallest known adults are less than 5 mm in length and the largest exceed 60 cm. Shape and ornamentation of the exoskeleton are also highly variable and almost every conceivable combination of characters has occurred throughout the history of the group, sometimes resulting in bizarre forms.

The evolution of trilobites through the Palaeozoic Era, evidenced by the change in characters of the exoskeleton, provides palaeontologists with a means of subdividing portions of that span of time. Trilobite remains have been particularly useful in zoning the Cambrian Period. As a result, strata of sedimentary rocks of one region containing certain trilobite fossils can be correlated with strata of another region containing the same or similar species. In addition, the palaeontologist can make other deductions about the rocks in which trilobites are found. Strata that contain abundant remains of trilobites obviously originated from sediments deposited in marine waters, since that is where trilobites lived. Examination of the types of trilobites present in the strata may reveal the particular kind of marine environment in which the sediments and the fossils they contained were accumulated. The information deduced from these palaeoecologic and biostratigraphic investigations is usually combined with knowledge gained from other groups of fossil organisms present in the same strata. The combination of data serves to reinforce or confirm conclusions about age or environment as well as to fill in gaps and correct misinterpretations which might be inherent in studies of a single group.

The rocks underlying the downtown Toronto region are Upper Ordovician in age, and the sediments of which they are composed were deposited in warm, shallow subtropical seas about 440,000,000 years ago. The limestones, shales, and sandstones which are exposed in the Don and Humber River valleys, in building excavations, and in the Toronto Brick Company Quarry have been placed in the Georgian Bay Formation. These rocks extend in the subsurface as far as the Meaford area on Georgian Bay, where they are also well exposed.

Among the numerous and diverse fossil remains found within rocks of the Georgian Bay Formation at Toronto are at least three species of trilobites. By far the most spectacular of these is *Isotelus maximus*.

Above: Flexicalymene granulosa, *about 4 cm long. The specimen illustrates the typical lobation of the glabella. Georgian Bay Formation, Toronto.*

ERA	M.Y.	PERIOD	LIFE
CENO-ZOIC	1.5	QUATERNARY	
	70	TERTIARY	
MESOZOIC	71	CRETACEOUS	
	44	JURASSIC	
	45	TRIASSIC	
PALAEOZOIC	55	PERMIAN	
	65	CARBONIFEROUS	
	50	DEVONIAN	
	35	SILURIAN	
	70	ORDOVICIAN	
	70	CAMBRIAN	

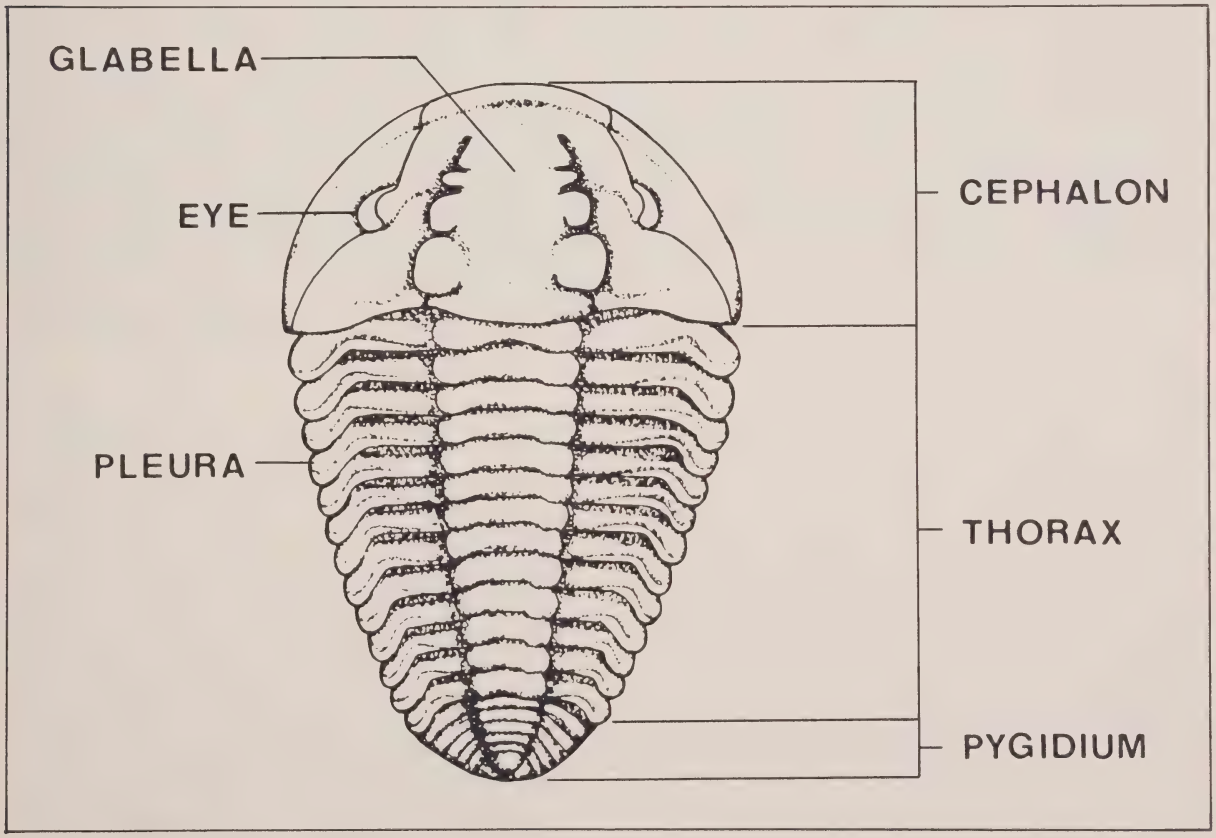
Right: Simplified chart of geological time, omitting the Precambrian Era. Numbers indicate durations of periods in millions of years.

Specimens of *Isotelus* recovered from the old Don Valley Brickyard (Toronto Brick Company Quarry) during the late 1800s and early 1900s, and now in the Invertebrate Palaeontology collections at the ROM, measure up to 30 cm in length; they are among the largest of all Ordovician trilobites. *Isotelus* belongs to a group of trilobites characterized by a smooth, almost featureless exoskeleton. The familiar trilobation is very faint, the cephalon and pygidium are identical in size, and the thorax is composed of eight wide segments.

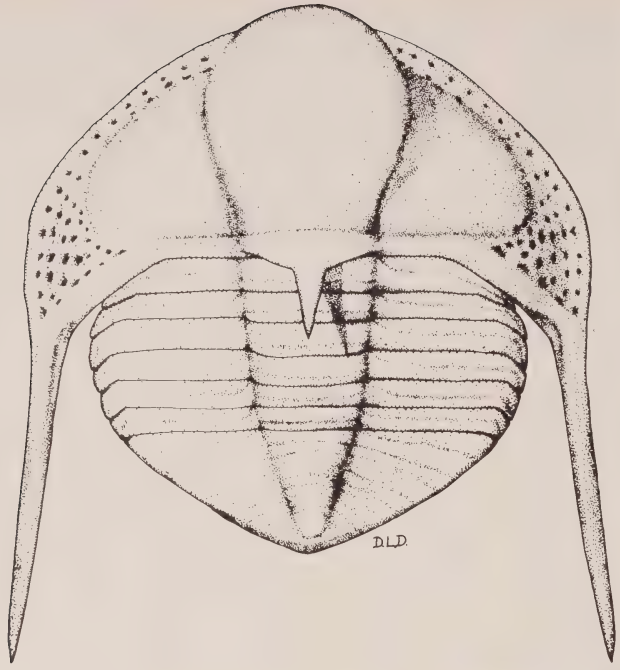
Despite its large size as an adult, *Isotelus* started off in a small way. Trilobite eggs are not known from the fossil record, but the tiny larval stages of many species have been thoroughly studied. The smallest known specimen of *Isotelus* from the Toronto area is only 10 mm long, but it exhibits most of the features of the larger adults. All sizes between the smallest and the largest specimens are well represented in rocks of the Georgian Bay Formation.

A second trilobite species found in the Toronto region, *Flexicalymene granulosa*, is much more typical in size, attaining a maximum length of about 4 cm. *Flexicalymene* is characterized by a distinctive lobation of the central part of the cephalon (glabella), a pygidium noticeably smaller than the cephalon, and a thorax of thirteen highly arched segments.

Preserved in the rocks along with remains of *Flexicalymene* are two curious structures. One of these, *Cruziana*, is a ribbonlike form appearing as a series of chevron-shaped ridges nested inside each other. The second structure is elliptical in outline and consists of two distinct lobes; it has been named *Rusophycus*. When these forms were first studied by palaeontologists more than a hundred years ago, they were interpreted as remains of marine algae or seaweeds, and often lumped together under the name "Fucoids". The eminent Canadian geologist Sir William Dawson first published his interpretation of these structures in 1865, attributing *Cruziana* and *Rusophycus* to the burrowing and crawling actions of certain trilobites, but it was not until many years later that this view was widely accepted. One of the deciding factors in favour of Dawson's theory was the later discovery of the trilobite *Flexicalymene* still resting in a specimen of *Rusophycus*. This was found in rocks around Cincinnati, Ohio, which are equivalent in age to the Georgian Bay Formation, and so it is very likely that many of the *Rusophycus*



A generalized sketch of Flexicalymene *with the principal exoskeletal features labelled. About 2× natural size.*



Above left: Cryptolithus bellulus, *reconstruction of the exoskeleton. About 5 × natural size.*

Above right: Rusophycus *species, about 4 cm long. A resting trace probably produced by* Flexicalymene. *Georgian Bay Formation, Toronto.*

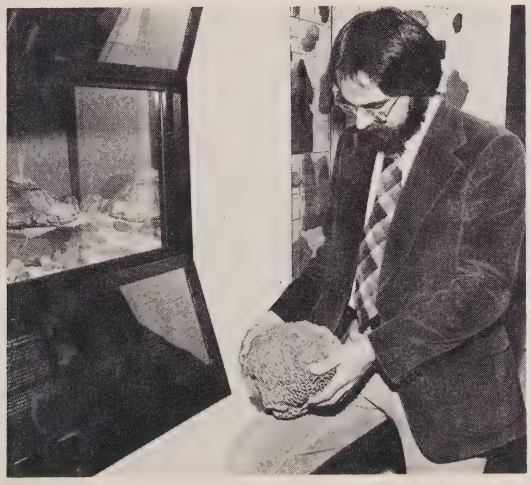
Right: Cruziana *species, about 2 cm wide. A crawling trace probably produced by* Flexicalymene. *Georgian Bay Formation, Toronto.*

and *Cruziana* structures from Toronto were also made by *Flexicalymene*.

A third species of trilobite found in the Upper Ordovician strata beneath Toronto is a diminutive form named *Cryptolithus bellulus*. The fact that this species is less common than either *Isotelus* or *Flexicalymene* may simply be a reflection of its smaller size (average length 1.5 cm). *Cryptolithus* is a rather ornate trilobite possessing a pair of very long rearward directed spines termed genal spines, one on each posterior corner of the cephalon. Around the front edge of the cephalon is a series of minute pits arranged in a distinctive pattern. An important feature which sets *Cryptolithus* apart from the other two species of trilobites found at Toronto is its lack of eyes. Both *Isotelus* and *Flexicalymene* had a pair of well-developed eyes composed of a large number of individual lenses, packed closely together and covered by a single cornea. Recent studies have revealed that the trilobite eye was an extremely sophisticated organ; unfortunately, *Cryptolithus* did not benefit from this optical wonder. Apparently its mode of life was such that it could function perfectly well without eyesight.

These three species of trilobites, which inhabited the seas covering the Toronto region about 440,000,000 years ago, were probably as different in life habits as they were in size and appearance. At present we know very little about the life of trilobites and can only speculate on such aspects as feeding habits, reproductive biology, and life span. But as study techniques become more refined and greater numbers of specimens are recovered and examined, we can hope eventually to answer many of the remaining questions about this fascinating group of extinct arthropods.

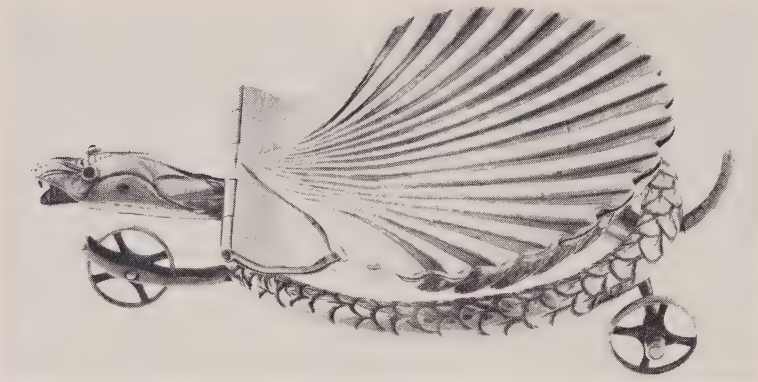
Cryptolithus recurvus, *about 1.5 cm long. The specimen is similar to those found at Toronto; from the Middle Ordovician of Pennsylvania.*



David Rudkin is a technician in the Department of Invertebrate Palaeontology. As a graduate of the University of Toronto in geology and biology, Mr. Rudkin's primary interests are in Lower Palaeozoic arthropods, and in the relationships of fossil organisms with their environments. He has travelled widely in North America collecting fossil material for the reference collections and for research purposes.

Photos: pp. 14 (left), 16 (bottom) photos and specimens R. B. Brewster; pp. 13, 16 (top left) drawings D. L. Dillon; pp. 12, 16 (top right), 17 Photography Department, ROM; *p. 15 drawing D. M. Rudkin,* ROM.

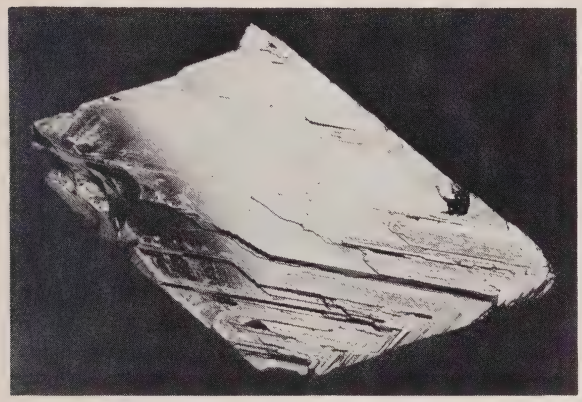
The Growing Collections



A recent acquisition of the Canadiana Department, this silver snuffbox is made in the form of a scallop shell which is mounted on a coiled snake with garnet eyes. The inscription on the snuffbox tells us that it was presented by Major Paterson to his 63rd Regiment mess in Halifax on 16 August 1861. The piece is marked by James Carr of Halifax, who was working from 1856 to 1902. D.B.W.

The Department of Ethnology has enriched its Iroquoian collection by the recent purchase of two small beaded bags. Miss Ida Bowen, the former owner, explained that these items were acquired by her grandfather near Niagara Falls before 1860. The bags remained in the family's possession in England until a recent visit to Niagara Falls prompted Miss Bowen's decision that Canada was their rightful home.

The bags are made of paper-backed cloth which is richly beaded. They date to the first quarter of the 19th century and the elements of the design—symbolic flowers intertwined with scrolls and a unique double curve motif—are distinctly those of the aboriginal Eastern Woodlands area. The significance of these designs has been debated by scholars throughout this century. Long before the advent of glass beads, these motifs were executed in paint, moose hair, and porcupine quills on clothing and bags from the area between Nova Scotia and Labrador through to the lower Great Lakes. The motifs signified basic relationships in the traditional cosmology of the Native peoples. Local tribal embellishments and transpositions were made, but the designs were later eclipsed by the decorative iconography of the Victorian era. R.D.



Recent additions to the mineral collections at the ROM include some 200 specimens. One acquisition, a magnificent serandite from Mont St. Hilaire, Québec, was described in *Rotunda* (Vol. 13, No. 2). About twenty-five species new to the collection were acquired by presentations, purchases, and exchanges. Specimens from a number of localities in the USSR were obtained through an exchange arranged in the latter part of 1979 with the A. Y. Fersman Mineralogical Museum in Moscow.

Earlier this year the Museum was fortunate to receive a special acquisitions grant from Wintario, which enabled the department to purchase an exceptional cubanite crystal (illustrated) found in the Strathcona Mine at Sudbury, Ontario. It measures 3.5 cm × 2 cm × 0.5 cm and is one of the largest known crystals of this mineral found anywhere in the world. Besides being very large, this superb specimen also shows the classic twinning usually seen in this mineral and has bright, brass-coloured crystal faces.

Another specimen acquired recently is from Wyoming and contains excellent crystals of kaolinite. Although kaolinite is a common mineral in the clay group, well-defined crystals are extremely rare. These crystals are a few millimetres long and 0.5 mm wide. The specimen was presented to the ROM by William W. Pinch of Rochester, New York, in recognition of the visit to the ROM during the first part of 1980 of Dr. R. L. Freed of San Antonio, Texas. Dr. Freed is a Research Associate of the department and a specialist in clay mineralogy.

In the past six months about 600 rock samples from the Precambrian in Ontario have been accessioned into the geological collection. Most of the samples are accompanied by the thin sections mounted on glass slides that are essential for the accurate identification and study of the rocks.

A collection of eleven early exploration maps of the Nipissing area were presented to the department by Mr. William J. Kennedy of North Bay, Ontario. These maps, published in the mid-1800s, contain some of the earliest recorded observations of the geology of the French River, the Sturgeon River, and the Ottawa River, and are important acquisitions. R.I.G.

While dinosaurs lived on the land 75 million years ago, other creatures lived in a broad shallow seaway which linked the Arctic to the present-day Gulf of Mexico. Three recent ROM expeditions to western Kansas have produced a good series of sharks, bony fish, giant swimming lizards, birds, and flying reptiles (pterodactyls). One prize is this 66-cm-long soft-shelled turtle, complete with limbs and skull. The animals from this ancient seaway will probably be displayed in the enlarged Vertebrate Palaeontology galleries. A.G.E.

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In 1974 the Allen G. Gray Collection came to the Museum on loan. It consists mainly of portrait miniatures, but there is also important peripheral material. Thanks to the very generous help of the McColl Foundation and seven other friends of the European Department, the collection now belongs to the ROM. Each object in the group is significant for its distinctive character and its high quality.

The first item shown here is an ivory relief (1) of a woman twenty to twenty-five years old, depicted in profile. The relief is undoubtedly Dutch and was probably made before 1700. This portrait of high quality expresses the softness of the sitter's features well. The frame is hand sculpted and includes two caryatids that support the inner oval relief.

The next example illustrated is a silver-gilt medal (2). Mr. Brian Musselwhite has identified its emblem as that of the Anti-Gallic Society, a little-known fraternity. The chased front of this frail and delicate object includes British and Prussian heraldic emblems combined with Rococo-style ornamentation which follows the lines of a shield. The front was soldered to the plain back and a hollow was left between the two pieces. This mid-18th-century English medal is a fine and unusual example of the silversmith's craft.

The landscape miniature illustrated (3) was used to decorate a snuffbox. Neither painted nor carved, the landscape is a miniature mosaic of the type usually attributed to the workshop

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of Giacomo Raffaelli of Milan and dates to shortly before 1800.

The fourth example illustrated is an enamel (4) made to decorate a snuffbox or perhaps a fine piece of furniture. An upright oval, the miniature shows two young girls listening to a musician playing a lute. This work dates to the late 18th century. Mention should also be made of a miniature icon (5) which depicts St. Nina of Georgia. This icon is East European—probably Russian—and is dated to the late 18th century.

The last item illustrated is a bozzetto (a preparatory model for a sculpture) in pink wax showing the profile portrait of a man with a Roman nose and wearing a wig (6). A note attached to the back of the wax medallion, probably written by the artist, states that this is the portrait of "the Late John Hyde Esq.". The portrait is signed "P. Rouw" and dated 1811. It was probably sculpted by Peter Rouw II, who was born in the third quarter of the 18th century. His output cannot always be distinguished from that of his father—their work is of equal quality. Both artists signed their pieces P. Rouw. This bozzetto, a good collector's item, has the strength and liveliness often seen in a preparatory model—elements that are sometimes lacking in the finished article.

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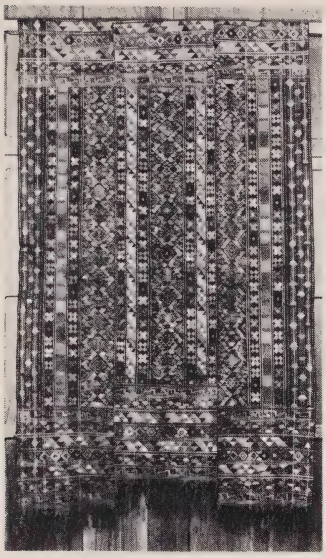
These six examples from the Allen G. Gray Collection are all highly desirable for their interesting character and the high quality of the craftsmanship. H.H.-S.



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The holdings of Asian textiles and costumes in the Textile Department have increased dramatically during the last six months. The gift of seventy-six Bhutanese costumes and fabrics from Mr. Samuel Sarick has filled a long-standing gap in the collections. Formed in Nepal, this collection represents two major socio-cultural strata: the folk/peasant traditions from central Bhutan and the aristocratic/gentry traditions from central and eastern Bhutan. The collection also includes a small group of ceremonial or ritually significant fabrics. Bhutan occupies a strategic position in the Himalayas between the major cultures of China and Tibet in eastern Asia and India and Indonesia to the south. Bhutanese garment traditions, influenced by both north and south, include draped wrappers such as the example illustrated (1, from eastern Bhutan, 1900–1950) which is made of cotton brocaded with raw silk; cloths made of three loom-widths to indicate prestigious social status, which are typical of southern Asia; and constructed garments related to central Asian and Tibetan traditions. Because of the inaccessibility of Bhutan, textiles from this part of Asia are not readily available for study. The importance of this gift has been recognized by the Canadian Cultural Property Export Review Board which has designated the collection of national significance.

A collection of thirty-seven embroideries acquired in Szechwan Province in the 1940s by Mrs. Eleanor Conway, who worked as an occupational therapist in the West China Union hospital in Ch'eng-tu, was purchased with the help of a Wintario grant made available to the ROM through the Ministry of Culture and Recreation. Although these peasant embroideries in blue cross-stitch employ a Chinese decorative vocabulary, technically they relate to non-Chinese embroidery traditions from central Asia and southeast Asia. These articles were saved by Mrs. Conway at a time when the society that produced them was discarding them as old-fashioned. The collection includes a child's bib vest (2) made of white cotton with blue cross-stitch embroidery featuring animals representing the "five poisons" on the pocket; above are butterflies that symbolize wishes for happiness (Szechwan Province, 1875–1900). Thanks to Mrs. Conway's foresight, these important documents of social and cultural history have survived and are now available to students and scholars.

Mrs. E. A. Macdonnell has added several gifts to the collection of Indonesian textiles that she began for the ROM during the 1960s when she was living in Jakarta (her husband was the Canadian High Commissioner there). Mrs. Macdonnell's interest in forming a comprehensive holding of Indonesian fabrics from all the islands has made the ROM collection one of the important holdings in North America. Recent gifts have included rare examples from the Toradja tribe of the Celebes such as the mud-dyed ikat cotton blanket (3, 1900–1950), a major ship cloth from Sumatra, two ikat wrappers from Sumba, and several batik pieces from Java.

J.E.V.

During the past two years the trilobite collections of the Department of Invertebrate Palaeontology have been expanded significantly as a result of generous donations, judicious purchases, and intensified collecting.

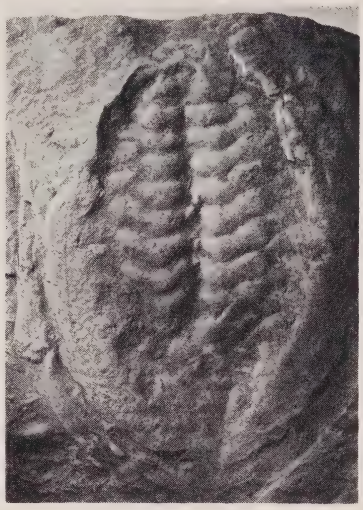
Dr. Rolf Ludvigsen (Department of Geology, University of Toronto), a Research Associate of the Department of Invertebrate Palaeontology, has provided a large representative collection of superbly preserved trilobites from a critical sequence of Ordovician rocks in the Nahanni River area, District of Mackenzie. In addition, many of the specimens illustrated in Dr. Ludvigsen's *Fossils of Ontario Part 1: The Trilobites* and in several of his other papers published by the ROM are deposited in the department's type collections.

A number of amateur collectors have also donated unique or important Ontario specimens, such as the example of *Hypodicranotus* sp. shown here. This specimen, a rare trilobite from the Upper Ordovician Lindsay Formation (440 million years old) near Craigleith, Ontario, was previously unreported from the Lindsay Formation and was poorly represented in the ROM collections. This specimen was donated by Evan Atwood in 1979. Also donated in 1979, by Geoffrey Watson, is *Rusophycus carleyi* (James), a mould of the depression excavated by the trilobite *Isotelus maximus*, from the Upper Ordovician Georgian Bay Formation, Erindale, Ontario. Although *Isotelus maximus* is a common Toronto area trilobite, its fossil tracks have not previously been reported from this area.

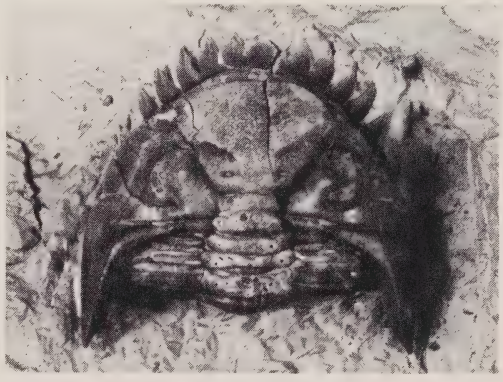
Purchases from collectors and dealers in Ontario and the United States have added several lots of noteworthy material for gallery displays and the reference collection. The illustrated specimen of *Greenops boothi* (Green) from the Middle Devonian Hamilton Group (370 million years old) from Hungry Hollow, near Arkona, Ontario, was purchased in 1979. This animal has rolled up so that the tail spines are visible as a fringe around the head.

Recently renewed collecting by departmental staff members in the richly fossiliferous Middle Ordovician rocks of southern Ontario has produced a variety of previously rare or unreported trilobite specimens from several horizons. Work is continuing on this project with a view to providing data on the age relationships and palaeobiogeography of the Ordovician succession in Ontario. D.M.R. and J.B.W.

Hypodicranotus sp.



Rusophycus carleyi (James)

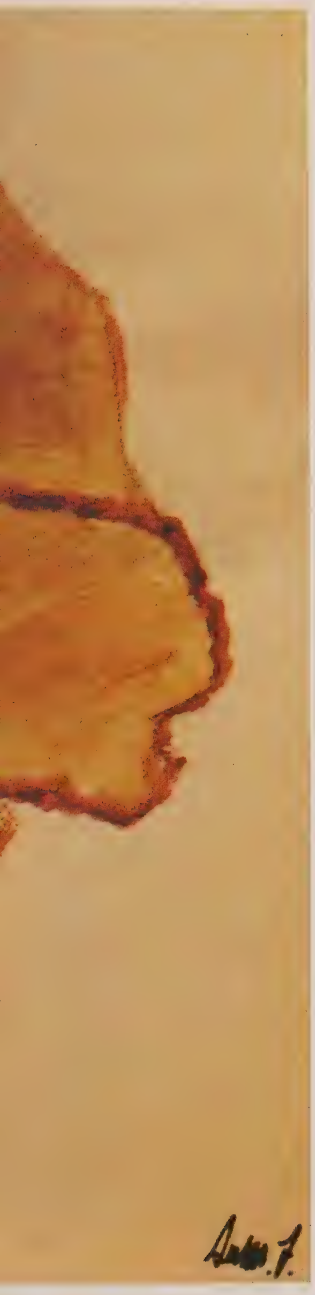


Greenops boothi (Green)

Photos: p. 23 (bottom) P. Fenton, ROM; p. 22 (left) N. Maxwell; pp. 18 (3), 19 (2), 20 (3), 21 (3) Photography Department, ROM; p. 22 (middle) William Robertson, ROM; p. 23 (2, top) David Rudkin, ROM; p. 22 (right) J. E. Vollmer, ROM.

Opposite page: A school class studies "Eremotherium: the Giant Ground Sloth" in the Chatham Public Library.

Below: Children in the art programme find ROM artifacts and specimens fascinating. A Hopi Indian display inspired this watercolour.



Discover the ROM

Two New Programmes for the Public

Gail Corbett

OVER THE NEXT DECADE attendance at museums and art galleries could increase more than any other leisure activity. A recently released Statistics Canada report, *The Changing Education Profile of Canadians 1961–2000*, estimates a potential growth of 30 per cent in the number of museum and art gallery visits from 1977 to 1990. And what is the ROM doing to meet this challenge? Among other things, it is responding with new programmes, both inside and outside the Museum. Two of these, "Art Instruction at the ROM" and "Discover the ROM Van", are good examples of how programmes that make special use of the ROM's unique collections and expertise can be developed to attract and interest a large and varied audience.

Who would have expected, for example, to find the skull of a giant ground sloth in Gananoque this past May? Or a 7th-century B.C. Greek helmet in Renfrew? These two extraordinary objects, along with many other specimens and artifacts from the ROM collections, were in the public libraries of those communities thanks to the "Discover the ROM Van" project. Recently initiated by the Extension Services Department, the project shows an innovative approach to travelling exhibits. It consists of several small self-contained displays (maximum dimensions ten feet by five feet by seven feet), with built-in atmospheric and security controls, transported in a van. Individual displays, with text panels and accompanying brochures in both French and English, are delivered to a number of locations, where they are set up and interpreted by a bilingual Museum resource person. The displays are left in each location for two weeks and then they are rotated so that in the course of thirteen weeks each of five communities plays host to six completely different ROM exhibits.

And so it was that in the spring of 1980 a Carleton Place kindergarten class, accompanied by their teacher, visited the local library to see the ROM exhibit "Flights of Fancy: Butterflies and Moths of Canada". The children were intrigued by the display and their first visit to a museum exhibit was considered a great success. Two weeks later several men who are not regular patrons came in to the same library especially to see "Lock, Stock, and Barrel", the ROM exhibit of 19th-century firearms. And one day the following month a class of school children visited the library to see "Eremotherium: the Giant Ground Sloth". That evening they brought their parents to the library so that they could repeat to them the fascinating facts they had learned earlier in the day. Many people in the area have never been to the Royal Ontario Museum but through this new programme "the Museum has been to them".

Just as "ROM wasn't built in a day," so the "Discover the ROM Van" did not come about overnight. Since its formation in 1974 the Extension Services Department has been serving an ever-increasing number of museums, libraries, schools, and provincial parks throughout Ontario. The staff of the department, well aware of their mandate to bring the collections and expertise of the ROM to the people outside Metropolitan Toronto, have developed various programmes to reach different audiences. Two museumobiles ply the province, carrying their self-contained galleries to all parts of Ontario accessible by road. A wide range of travelling exhibits has been produced, and the exhibits have been sent out to museums, libraries, art galleries, and National Exhibition Centres as far away as British Columbia and New Brunswick. Speakers from the Museum have addressed groups in locations from Moosonee to Chatham. Carefully prepared trays of artifacts and specimens, along with lesson plans and other teaching devices, have been designed for use by teachers and sent to schoolboards throughout Ontario. Two series of radio programmes about Museum people and their work have been recorded and sent to Ontario radio stations. Through all these efforts, and in a relatively short time, the Extension Services Department has succeeded in building an eager and growing audience for programmes from the Royal Ontario Museum.

However, there remained one group that was keen to receive ROM exhibits—the small libraries and museums throughout the province. Ontario is particularly well served by its library system: more than 99 per cent of the population have direct access to more than 900 branches of the Ontario Regional Library Systems. Although many hundreds of these libraries are very small and are open only a few hours a week, they are very important centres in their communities. Some that were originally Carnegie libraries are imposing structures built at the beginning of the century and can be found all over Ontario from Yorkville in Toronto to New Liskeard and Port Elgin. Other libraries are housed in buildings originally intended for quite different purposes; for example, the library in Huntsville is a converted liquor store, the one in Nepean a former supermarket, and the one in Moose Creek a renovated chicken hatchery.

In addition, there are about 330 museums in Ontario, some open only in the summer months and many housed in unexpected quarters. The North Bay

"Mukanda: Coming of Age on the Zambezi", with its African dance costume, fascinates these visitors to the Windsor Public Library.

Area Museum was once a classroom; the Hastings County Museum in Belleville is a restored Victorian mansion. Naturally enough few of these buildings are able to accommodate the type of travelling exhibit the Extension Services Department sends out to National Exhibition Centres and to the larger museums and libraries. "Words of the Gods", for example, is a beautiful exhibit of Egyptian hieroglyphs that has been extremely popular. Since it requires twenty-six running feet of floor space, it is ideal for the Algoma Art Gallery in Sault Ste. Marie—but beyond the capacities of communities that do not have large exhibit areas. Moreover, the older facilities, and even some of the newer ones built for other purposes, are unable to maintain the temperature and humidity levels necessary for the conservation of the fragile objects in the displays.

To meet these challenges the Extension Services Department drew up a plan in 1978, and with funding from the Core-Funding Programme of The National Museums of Canada the "Discover the ROM Van" was born. Bill Nethery, a former museumobile driver-interpreter, was made responsible for coordinating the project. A vehicle was chosen and specially modified with atmospheric and security controls. The Extension Services Department worked with curatorial departments, designers, preparators, conservators, and carpenters, and by the fall of 1979 six varied and exciting exhibits were available for circulation.

"Eremotherium: the Giant Ground Sloth" was created with the Department of Vertebrate Palaeontology; it not only includes specimens of the remains of the animal but also demonstrates the method of recovery and reconstruction of a fossil specimen. "Flights of Fancy: Butterflies and Moths of Canada" was produced from an earlier display of material from the Department of Entomology. "Up in Smoke" concentrates on pipes and smoking accessories from the European Department. "Mukanda: Coming of Age on the Zambezi", an eye-catching display from the Department of Ethnology, highlights an African dance costume. "Warfare in Ancient Greece" is a display of various artifacts from the Greek and Roman Department. "Lock, Stock, and Barrel", produced with the Canadiana Department, is an exhibit of percussion-lock weapons of the 19th century, complemented by powder horns and other related artifacts.

The first tour in the fall of 1979 took the "Discover

"Flights of Fancy: Butterflies and Moths of Canada", with its ninety-eight mounted specimens, warrants a closer look in the Four Corners Library in Brampton.

Right: A Roman burial portrait served as the model for this painting done in encaustic, an ancient technique of painting in molten beeswax.

Below: The tomb setting in the Chinese Garden provides this young artist with the added advantage of natural light.

the ROM Van" to the Southwestern Ontario Regional Library System; exhibits were set up in libraries in Sarnia, Windsor, Leamington, Wallaceburg, and Chatham. This was followed by a spring tour to libraries in eastern Ontario and a summer tour to museums in Belleville, Picton, Napanee, and Bowmanville. The response of the communities has been very enthusiastic. A delighted librarian from Leamington wrote: "The school children are still reacting to your talks—the circulation of books on anthropology and life in Africa attests to their continuing interest." As many as seven school classes have viewed an exhibit in one day. Adults, too, have been attracted to the exhibits, and these have become media events wherever they have gone. From Windsor to Deep River, front-page stories have heralded the exhibit openings. In one year almost 100,000 people have taken the opportunity to "Discover the ROM" in their own communities.

Meanwhile another "discovery" programme is under way inside the Museum, where the "Art Instruction at the ROM" classes have been making use of the gallery collections in an entirely different way. "Let the Royal Ontario Museum . . . be your art studio!" invites the brochure; every week last winter 320 people, ranging from teenagers to senior citizens, accepted the invitation and attended classes in drawing, painting, Chinese brush painting, and calligraphy.

It would be difficult to find another location with such a wealth of subject material. Where else could the painter of wildlife study a tuatara, "the sole living representative of a very ancient order of reptiles found only on a number of small islands off the coast

The masks in the Department of Ethnology provide children with exciting imagery. This child's work was rendered in pastels.

of New Zealand"? Where else could a watercolour class be taught to look at the stegosaurus as "a study in negative and positive space" with "some very interesting bones"? Mummies, shrunken heads, Roman busts, suits of armour—all have served as models for the art classes.

The very successful Saturday Morning Club for children has been active in the Museum for forty years (it counts among its alumni many present-day Museum staff members). The club is operated by the Education Services Department and has as its stated purpose "to create a series of shared experiences through which members can grow to better understand, appreciate, and enjoy our Museum and its collections". To this end the club offers activities that range from constructing model dinosaurs to visiting the "bug" room and making corn-husk dolls.

The idea grew that adults might be offered a similar opportunity, that art classes in the galleries might be a very effective means of helping them to "Discover the ROM". After all, other institutions had been bringing art classes to the ROM for years—first the Ontario College of Art and later community colleges offering Museum Drawing classes. Why should the Museum itself not hold art classes in the galleries?

And so in the summer of 1978 the first classes in painting and drawing began, with sixty students enrolled. Two years later more than 1,500 places have been filled and the content of the classes has been expanded. The programme has broadened to include "arts" instruction for children from ten to thirteen, and more than 500 children have taken part in courses in painting, sculpture, animation, and drama in a little over a year. Now there are fifteen

teachers active in the programme; most of them are practising artists and some of them maintain their own studios. The teachers attempt to identify the particular strengths of each student and the result is a highly individual method of instruction. Students particularly enjoy the remarkable variety of subjects for the classes. One wrote: "[the class] has helped me to become more observant of all I see and more appreciative of the efforts involved in works of art."

As well as inspiring models, the Museum classes offer unique examples of unusual art techniques. In the Historic Painting Techniques class, encaustic painting, the method of painting with molten beeswax used in ancient Egypt, Greece, and Rome, is taught in the galleries. In the Chinese galleries students pursue the traditional art of Chinese brush painting, using authentic materials such as ink stones, rice paper, and bamboo brushes. Calligraphy students learn European penmanship and the history of illumination as it evolved from the 4th to the 16th century; examples from the manuscript collection and the Museum setting provide the perfect atmosphere for this study.

The materials used in the classes are almost as varied as the models: pencil, conté, charcoal, pen and ink, pastels, and watercolours. In one course students make their own pastels from raw pigment and a gum solution and so are able to create their own colours. In a colour and design course students use ink, acrylic, and gouache to reproduce the colours and motifs of such Museum treasures as the Imperial Chinese robes and the Peruvian burial robes.

As the galleries are closed to accommodate the work of renovation and expansion of the ROM, art classes in the Museum are being suspended. Future plans for the programme, however, feature a larger activity centre that will permit an even wider range of programmes, with plans for classes in ceramics and various textile courses such as weaving and dyeing.

According to a study published in 1974, *The Museum and the Canadian Public* by Brian Dixon et al., two changes museum visitors and potential visitors would like are workshops in museums, with resident working artists and craftsmen, and museum exhibits available in their own neighbourhoods. The two ROM programmes "Art Instruction at the ROM" and "Discover the ROM Van" fulfil these desires. What is more, they meet another condition emphasized by the study, the importance of the educational role of the museum. Certainly the programmes have been well received by the public. They are good examples not only of how to attract visitors to the museum but also of how to provide a meaningful and enjoyable experience for them during the visit.

Opposite page: This watercolour incorporates a detail study, a lettered title, and a natural setting.

Left: The Far Eastern Galleries are a perfect setting for Andrew Chang's demonstration of Chinese brush painting techniques

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Gail Corbett received an Honours B.A. in Modern Languages and Literatures (French and Spanish) from the University of Toronto, and later a Bachelor of Library Science degree. She worked in various libraries, among them the Rare Book Room of the McGill University Library and libraries in York University and the Department of the Secretary of State. Gail then spent several years working on television public affairs programmes as a researcher, story editor, and associate producer. She also spent a year studying and working in Madrid. She joined the ROM *in 1977 as Media Coordinator for the Extension Services Department and this year transferred to Programmes and Public Relations.*

Photos: pp. 24, 25, 29 Anne Armstrong, ROM; *p. 27* Brampton Daily Times; *p. 31 (bottom)* Photography Department, ROM; *p. 26* Windsor Star; *pp. 28 (2), 30, 31 (top)* Peter Wood, ROM.

The "Discover the ROM Van" exhibits "Warfare in Ancient Greece" and "Lock, Stock, and Barrel" will be on display in the Lower Rotunda, Royal Ontario Museum, from 16 September to 2 November 1980.

The Encantadas

A Biologist's Haven in the Sun

Chris McGowan

A FIVE-THOUSAND-KILOMETRE FLIGHT due south from Toronto brings a traveller to the beautiful city of Quito, capital of the Republic of Ecuador. While the coastal plain sizzles under the equatorial sun, in the mountain capital, which nestles high in the Andes, it is pleasantly cool. For most travellers to the Galápagos, Quito is the point of entry into Ecuador. It is here that they change from their flamboyantly decorated state-

Above: A male frigate bird displaying his brilliant red throat pouch, used to attract females. The thin skin of the pouch takes many minutes to inflate.

Opposite page: Tagus Cove, Albemarle Island. Our ship lies anchored in the farthest bay, the remains of an ancient volcano. The circular lake in the foreground, the remains of another volcano, is filled with brackish water.

airline Boeing 707 to a four-engine turboprop aircraft. According to the travel agent, the turboprop is operated by the armed forces, but a passenger has no way of knowing that he is not flying with a regular commercial airline. The flight, which goes only twice a week, is fully booked, and the plane fully laden with supplies. Before the aircraft flies out over the Pacific Ocean, there is a brief stopover in the coastal city of Guayaquil, where all passengers must leave the aircraft to purchase their entry permits to the islands. Some passengers will then make their way to the docks to board one of the large cruise ships that tour the islands, but the majority will return to the aircraft for the last leg of the journey.

Baltra, a fairly low and relatively barren island, was a United States Air Force base during World War II and the flight from the mainland lands on one of the abandoned airstrips. The landing is as gentle as the two-hour flight has been. A visitor's first impressions of Galápagos are perhaps not very different from Darwin's a century and a half ago. Landing on Chatham Island in the fourth year of his scientific odyssey Darwin wrote:

> Nothing could be less inviting than the first appearance. A broken field of black basaltic lava is everywhere covered by stunted brushwood, which shows little sign of life. The dry and parched surface, having been heated by the noonday sun, gave the air a close and sultry feeling, like that from a stove. . . .

Opposite page: This attractive school building stands on the main street of Puerto Villamil, a small fishing village on the southern tip of Albemarle Island.

Top: A Galápagos tortoise gazing out over the crater of Alcedo, Albemarle Island.

Bottom: A lava lizard basking in the early morning sun.

First appearances can be misleading, however, and Darwin, like many visitors since his time, soon fell under the spell of the Encantadas—the Enchanted Islands.

We arrived early in March, in the rainy season, when the islands are at their greenest. This is the time of year when the birds are breeding; the rearing of their young is synchronized with this period of plenty. It was therefore an ideal time for our visit, which was primarily concerned with studying the avifauna. Our small party of six included four scientists: two geologists and two biologists. The biologists, both from the ROM, were Dr. Allan Baker of the Department of Ornithology and myself from the Department of Vertebrate Palaeontology. The last-mentioned fact caused some mild interest at the time; why would a fossil man visit a volcanic archipelago which is devoid of fossils? Actually there are some fossils there, but these were of no interest to me.

What makes the Galápagos Islands so interesting to biologists? Is it the same thing that attracted 12,000 visitors last year? Most tourists probably go there because of the animal life; some may have read of Darwin's visit and know that the islands played a part in his work on the evolution of species. Most tours last less than a week, but the remarkable tameness of the animals guarantees that everyone will see a large variety of animals in that time. Penguins, sea-lions, marine iguanas, boobies—the list is almost endless and many of the animals will be viewed at closer quarters than would be possible in a zoo. Few cameras will be returned with unused film. For the biologist, however, the islands do not have a very great diversity of life; in fact, there are relatively few species. The interesting thing, however, is that though many of the species are similar to those on the mainland, they are found only in the Galápagos.

Species found only in one geographical area are described as endemic, and it is particularly interesting that many of the islands have their own endemic species. The colourful little lava lizards, for example, which are very common on most of the islands, show differences from one island to another, and six islands have their own endemic species.

Darwin was much impressed with the fact that the giant tortoises differed from island to island; unfortunately the visitor today does not see this striking example of endemism since most of the tortoises were hunted into extinction by hungry mariners during the last century. Darwin was also very interested in the occurrence of several species of finches (thirteen separate species are recognized today) which differed from one another mainly in the form of the bill. Some of the finches have broad bills and feed on hard seeds; others have slender bills which they use for probing for insects. All are endemic to the Galá-

pagos. The impact that the animals of the Galápagos had on the development of Darwin's ideas on evolution is best expressed in his own words in the second edition of his account of the voyage.

> Most of the organic productions are aboriginal creations, found nowhere else; there is even a difference between inhabitants of the different islands; yet all show a marked relationship with those of America. . . . Here, both in space and time, we seem to be brought somewhat near to that great fact—that mystery of mysteries—the first appearance of new beings on this earth.

In our visit to the archipelago, Dr. Baker and I had two primary objectives: to film and tape-record the behaviour of the Galápagos oystercatcher and to observe and film the flightless cormorant. We also hoped, with financial assistance from the Extension Services Department, to obtain some suitable film footage that could eventually be used in the production of educational programmes.

During our three-week sojourn we visited twelve islands, which included most of the visitors' sites. The movements of visitors are strictly regulated. They may visit only designated sites, which represent a mere fraction of the total area, and they must keep to the pathways that have been marked out by the National Park Service. The only exceptions are the places that have been permanently settled, of which there are four, with a total population of about 5,000. Most of the settlers are Ecuadorian, mainly farmers and fishermen. Each party of visitors must be accompanied by a guide at all times, and access to the visitors' sites is restricted to the hours between sunrise and sunset.

No collecting at all is permitted. No seashells, no pieces of coral, not even a piece of lava may leave the islands. As museum people, we found this last regulation especially difficult to live with, but we had no choice. How frustrating it was to have to walk past dead birds and lizards, specimens that would have made fine additions to our skeletal collections. In spite of the restrictions, we did manage to fulfil our primary objectives, but this was partly a matter of luck.

Quite by chance, a pair of oystercatchers built their nest a few yards from a footpath, presenting us with a golden opportunity to film and tape-record their behaviour. We took great pains not to disturb the birds; when a second party of visitors passed the spot we took the precaution of aiming our cameras in the opposite direction! The data we obtained are unique and will be the subject of a scientific paper. We were also very fortunate with the flightless cormorants and obtained some excellent film footage of their courtship behaviour and their swimming and feeding.

My interest in this particular species arises from my studies on the evolution of flightlessness. Did the kiwi, the ostrich, and other ratites (flightless birds) evolve from carinates (flying birds) or did they have an origin from a flightless ancestor? An analysis of the wing muscles of the kiwi—and other ratites—

Opposite page: We had to leave the islands by sunset to spend the night afloat, but we often received animal visitors from the shore. A group of pelicans swims alongside to beg scraps.

Right: The prickly pear cactus (Opuntia) *grows to the size of a tree on some of the islands. This one is on Barrington Island.*

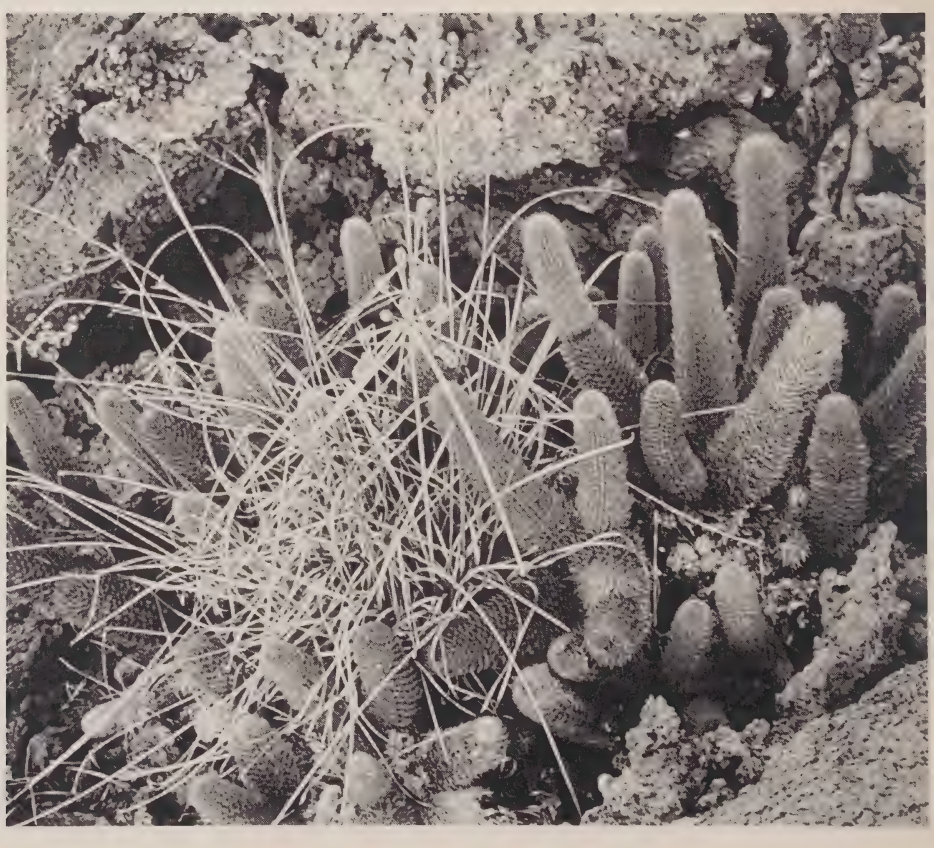
shows that these birds have fewer muscles than carinates, and that some of their muscles are less complex. In both these characteristics the ratites are more similar to reptiles than to other birds. In contrast, the flightless cormorant and other carinates that have lost the power of flight have the same muscles as their flying relatives; the only difference is in the relative sizes of the muscles. This has led some biologists to argue that the reason that ratites have fewer wing muscles than carinates is not that they have lost them during their evolution but that they evolved from a flightless, dinosaur-like ancestor, which did not possess all these muscles. This argument, while fairly persuasive, is by no means conclusive; much more work will have to be done before a conclusion can be reached.

Albemarle, the largest island in the archipelago, is more than a hundred kilometres long and is formed of a series of volcanoes, some of which are still active. It is here, in the highlands, that the giant tortoises still thrive. As we were interested in seeing these wild populations, we took an overnight camping trip to the rim of one of the volcanoes. Alcedo may be the lowest of the volcanoes, but the thousand-metre climb under an equatorial sun was probably the most exhausting exercise I have ever undertaken. As we had to carry our water supply and camping equipment, in addition to our cameras, we were quite heavily laden, and this added to our discomfort. We landed on the island at dawn, to take advantage of the coolest part of the day, and the first part of the climb was relatively easy. However, as we approached the rim of the volcano, some three hours later, there was an abrupt increase in the gradient and for the last half-hour of the climb we seemed to be clawing our way up the side of a house. We encountered several tortoises in the course of our ascent, but we were too concerned with our own survival to pay them much heed.

After we had recovered from our exertions, we hiked about one-third of the way around the crater rim and it was then that we saw most of our tortoises. The highlands are relatively cool and moist and support a fairly dense vegetation which provides ample browsing for these giant reptiles. We probably saw several dozen tortoises during the day and there is no question that these populations are quite secure. The adults are well over a metre in length and are so heavy that two men cannot lift one. In marked contrast to most of the other animals, the tortoises are shy and invariably retreat into their carapace with a loud hissing noise when they are approached. They

Above: Young sea-lions, like their parents, spend a lot of time dozing on the beach.

Right: Fairly recent lava flows can be seen on several of the islands and the first plant to obtain a foothold is this cactus, Brachycereus.



are very powerful animals. When we returned to our camp we found that a large male had ploughed into one of the tents (fortunately not Baker and McGowan's), and there was no way we could move him.

Another interesting feature of the large size of the tortoises is that their body temperature remains fairly constant throughout the day and night. Reptiles, unlike birds and mammals, do not have physiological mechanisms to maintain a constant body temperature and consequently are fairly sluggish in the cool light of dawn. The lava lizards we saw, for example, spent much of their time sunning themselves to raise their body temperatures to levels at which they could be active. Not so the tortoises. Because of their great body mass (and also because of their thick carapace, which is a fairly good insulator), they do not lose heat very rapidly. It was quite cold on Alcedo that night and we were glad to snuggle into our sleeping bags. When I awoke the following morning, I saw the tortoise who had come into our camp the day before. He had spent the night there and he, too, was awake—and, significantly, he was every bit as active as he had been the previous day. After I had passed the time of day with him, he kindly consented to let me touch him; his body was warmer than my cold fingertips!

What sort of impact do all the visitors have on the islands? Will our grandchildren be able to visit the Galápagos Islands and fall under their spell as we did? I believe they will. As long as the Ecuadorian authorities continue to restrict visitors to the designated sites, they should present no threat to the wildlife. What is more, they are a source of revenue for the National Parks, some of which is used for conservation programmes in the islands. (It seems to us that visitors would probably be prepared to pay more than the present nominal entry fee if they knew that the additional money would be used solely in the archipelago.)

The most serious threat to the native animals is that posed by domestic animals that have gone wild—especially pigs, goats, and rats. Hunters are hired to shoot these pests, and the programme has been successful on some of the islands, but there is still much to be done. James Island, for example, is overrun by thousands of feral (wild) goats and the task of eradicating them in such rugged terrain is virtually impossible. On one of the islands we met a young couple who were studying the impact of wild pigs on the marine turtles. The turtles return to the beaches each year to lay their eggs, but most of the eggs are eaten by the pigs. The researchers found that few of the turtle nests escaped detection and destruction by the pigs. Sometimes the pigs would even stand beside a laying female and eat the eggs as

The Galápagos land iguana, which reaches a length of more than 1 m, in contrast with its mainland relatives is yellow-brown rather than green. It is also considerably tamer.

Left: The total population of flightless cormorants is estimated at 800 pairs and they are restricted to certain parts of the coasts of Albemarle and Narborough islands.

they dropped into the nest. The pigs are audacious enough to have attacked the researchers on several occasions.

Perhaps the conservation programme that holds the greatest promise is the one for the land tortoises being conducted by the Darwin Research Centre, in conjunction with the National Park Service. Breeding pairs have been removed from their tenuous holds on several of the islands and are being bred in captivity. The offspring are cared for until they are large enough to stand a good chance of survival, and then they are released. One day, perhaps, it will once again be possible for visitors to see the giant tortoises roaming the islands, just as they did in Darwin's day.

Dr. Chris McGowan is Curator-in-charge of the Department of Vertebrate Palaeontology. He was born in England and spent his undergraduate and postgraduate years at the University of London. In 1969 he joined the ROM, *where he specializes in the study of Mesozoic reptiles. He is also interested in flightless birds and in 1977 spent six months studying some of these in New Zealand. He and Dr. Allan Baker of the Department of Ornithology are conducting a joint study of the relationships of the ratites.*

Photos: pp. 33, 34 (bottom), 40 (2) Allan Baker; pp. 32, 34 (top), 35, 36, 37, 38 (2), 39 Chris McGowan.

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